

REMARKS

I. Introduction

Claims 1 to 51 are pending in the present application. In view of the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

II. Rejection of Claims 1 to 5, 10, 13, 15 to 22, 25 to 28, 30, 33 and 37 to 39 Under 35 U.S.C. § 102(e)

Claims 1 to 5, 10, 13, 15 to 22, 25 to 28, 30, 33 and 37 to 39 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent Application Publication No. 2002/0090980 ("the '980 publication"). Applicants respectfully submit that the '980 publication does not anticipate the present claims for the following reasons.

The '980 publication was published on July 11, 2002 based on U.S. Patent Application Serial No. 09/683,250, which was filed on December 5, 2001. Enclosed herewith is a "Declaration Under 37 C.F.R. § 1.131" signed by the named inventors hereof, which establishes that the subject matter described and claimed in the present application was conceived prior to December 5, 2001 and that Applicants acted with sufficient diligence from prior to December 5, 2001 to the filing date of the present application, i.e., December 12, 2001. Under 37 C.F.R. § 1.131, prior invention may be established by establishing conception prior to the effective date of the reference coupled with due diligence from prior to the reference date to the filing of an application. Since the enclosed "Declaration Under 37 C.F.R. § 1.131" establishes conception of the subject matter hereof prior to December 5, 2001, i.e., the filing date of the '980 publication, and sufficient diligence from prior to the reference date, i.e., December 5, 2001, to the filing date of the present application, i.e., December 12, 2001, it is respectfully submitted that the '980 publication does not anticipate any of the present claims.

It is noted that the '980 publication claims the benefit of U.S. Provisional Application Serial No. 60/251,443 ("the '443 provisional application"), which was filed on December 5, 2000. As an initial matter, a copy of the '443 provisional application is enclosed herewith. The '443 provisional application does not include any of the figures of the '980 publication, including the figures mentioned in paragraph 3 of the Final Office Action, and the '443 provisional application does

not include the text that appears, for example, in paragraph 27 of the '980 publication mentioned on page 3 of the Final Office Action. For example, the '443 provisional application lacks the statement that "the external display could have the form of a scroll which could would [sic] around a rotatable member, the scroll lying flat against the side of the cell phone, or within the housing of the cell phone, when retracted, but extensible to form a flat external screen," which appears in paragraph 27 of the '980 publication and which the Final Office Action appears to consider to constitute a disclosure of a collapsible display as recited in claim 1. The '443 provisional application makes no mention of at least a collapsible display as recited in claim 1. Thus, the subject matter mentioned and relied on in the Final Office Action is not entitled to the benefit of the December 5, 2000 filing date of the '443 provisional application.

The submission of the enclosed "Declaration Under 37 C.F.R. § 1.131" is believed to be timely since the "Declaration Under 37 C.F.R. § 1.131" is being submitted with a first reply to the present Final Office Action "for the purpose of overcoming a new ground of rejection . . . made in the" present Final Office Action.

In view of all of the foregoing, it is respectfully submitted that the '980 publication does not anticipate any of the present claims. Withdrawal of this rejection is therefore respectfully requested.

III. Rejection of Claim 6 Under 35 U.S.C. § 103(a)

Claim 6 was rejected under 35 U.S.C. § 103(a) as unpatentable over the '980 publication. Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the '980 publication does not render unpatentable claim 6, which ultimately depends from claim 1.

IV. Rejection of Claims 7 to 9, 29, 35, 36 and 49 Under 35 U.S.C. § 103(a)

Claim 7 to 9, 29, 35, 36 and 49 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 publication and U.S. Patent No. 6,643,124 ("Wilk"). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the combination of the

'980 publication and Wilk does not render unpatentable any of the present claims, which ultimately depend from claim 1.

V. Rejection of Claim 12 under 35 U.S.C. § 103(a)

Claim 12 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 publication and U.S. Patent No. 5,589,835 ("Gildea et al."). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the combination of the '980 publication and Gildea et al. does not render unpatentable claim 12, which depends from claim 1.

VI. Rejection of Claim 23 Under 35 U.S.C. § 103(a)

Claim 23 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 publication and U.S. Patent Application Publication No. 2003/0098857 ("the '857 publication"). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the combination of the '980 publication and the '857 publication does not render unpatentable claim 23, which ultimately depends from claim 1. Furthermore, the '857 publication was published on May 29, 2003 based on U.S. Patent Application Serial No. 09/996,149, which was filed on November 28, 2001. The enclosed "Declaration Under 37 C.F.R. § 1.131" establishes invention by Applicants prior to the November 28, 2001 filing date of the '857 publication. It is therefore respectfully submitted that the combination of the '980 publication and the '857 publication does not render unpatentable claim 23 for this additional reason.

VII. Rejection of Claim 24 Under 35 U.S.C. § 103(a)

The Final Office Action states at paragraph 9 that claim 24 was rejected under 35 U.S.C. § 103(a) as unpatentable over "Gettemy et al. in view of Pawlowski et al. [U.S. Patent Application Publication No. 2003/0117382]." The Final Office Action then refers to the '980 publication. Thus, it is unclear from the Final Office Action as to whether claim 24 was rejected as unpatentable over the combination of the '857 publication and U.S. Patent Application Publication No.

2003/0117382 (“the ‘382 publication”) or over the combination of the ‘980 publication and the ‘382 publication. Clarification is respectfully requested.

Notwithstanding the foregoing, since the enclosed “Declaration Under 37 C.F.R. § 1.131” establishes invention by Applicants prior to the December 5, 2001 filing date of the ‘980 publication and prior to the November 28, 2001 filing date of the ‘857 publication, it is respectfully submitted that the combination of either the ‘980 publication or the ‘857 publication and the ‘382 publication does not render unpatentable claim 24, which ultimately depends from claim 1.

Furthermore, the ‘382 publication was published on June 26, 2003 based on U.S. Patent Application Serial No. 10/012,968, filed on December 7, 2001. The enclosed “Declaration Under 37 C.F.R. § 1.131” establishes invention by Applicants prior to the December 7, 2001 filing date of the ‘382 publication. It is therefore respectfully submitted that the combination of either the ‘980 publication or the ‘857 publication and the ‘382 publication does not render unpatentable claim 24 for this additional reason.

VIII. Rejection of Claims 40 and 41 Under 35 U.S.C. § 103(a)

Claims 40 and 41 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the ‘980 publication and U.S. Patent No. 6,445,489 (“Jacobson et al.”). Since the enclosed “Declaration Under 37 C.F.R. § 1.131” sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the ‘980 publication, it is respectfully submitted that the combination of the ‘980 publication and Jacobson et al. does not render unpatentable either of the present claims, which ultimately depend from claim 1.

IX. Rejection of Claims 14 and 42 Under 35 U.S.C. § 103(a)

Claims 14 and 42 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the ‘980 publication and U.S. Patent No. 6,384,804 (“Dodabalapur et al.”). Since the enclosed “Declaration Under 37 C.F.R. § 1.131” sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the ‘980 publication, it is respectfully submitted that the combination of the ‘980 publication and Dodabalapur et al. does not render unpatentable either of the present claims, which depend from claim 1.

X. Rejection of Claim 11 Under 35 U.S.C. § 103(a)

Claim 11 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 publication, Dodabalapur et al. and U.S. Patent No. 6,459,418 ("Comiskey et al."). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the combination of the '980 publication, Dodabalapur et al. and Comiskey et al. does not render unpatentable claim 11, which ultimately depends from claim 1.

XI. Rejection of Claims 31, 34, 37 and 38 Under 35 U.S.C. § 103(a)

Claims 31, 34, 37 and 38 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 publication and U.S. Patent Application Publication No. 2002/0055938 ("Matsuo et al."). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the combination of the '980 publication and Matsuo et al. does not render unpatentable any of the present claims, which ultimately depend from claim 1.

XII. Rejection of Claim 32 Under 35 U.S.C. § 103(a)

Claim 32 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 publication and U.S. Patent No. 5,452,092 ("Kang et al."). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the combination of the '980 publication and Kang et al. does not render unpatentable claim 32, which depends from claim 1.

XIII. Rejection of Claims 43 to 47 Under 35 U.S.C. § 103(a)

Claims 43 to 47 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 publication, Dodabalapur et al. and U.S. Patent Application Publication No. 2002/0176992 ("Parthasarathy et al."). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is

respectfully submitted that the combination of the '980 publication and Parthasarathy et al. does not render unpatentable any of the present claims, which ultimately depend from claim 1.

XIV. Rejection of Claim 48 Under 35 U.S.C. § 103(a)

Claim 48 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 publication, Dodabalapur et al., Parthasarathy et al. and U.S. Patent Application Publication No. 2002/0050958 ("Matthies et al."). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the combination of the '980 publication, Dodabalapur et al., Parthasarathy et al. and Matthies et al. does not render unpatentable claim 48, which ultimately depends from claim 1.

XV. Rejection of Claims 50 and 51 Under 35 U.S.C. § 103(a)

Claims 50 and 51 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of the '980 patent and U.S. Patent Application Publication No. 2001/0017604 ("Jacobsen et al."). Since the enclosed "Declaration Under 37 C.F.R. § 1.131" sufficiently establishes invention by Applicants prior to the December 5, 2001 filing date of the '980 publication, it is respectfully submitted that the combination of the '980 publication and Jacobsen et al. does not render unpatentable either of the present claims, which ultimately depend from claim 1.

XVI. Conclusion

It is therefore respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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☐ Additional inventors are being named on the ___ separately numbered sheets attached hereto**TITLE OF THE INVENTION (280 characters max)****DISPLAYS FOR CELLULAR TELEPHONES AND SIMILAR APPARATUS**

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Application Data Sheet. See 37 CFR 1.76

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Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

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DISPLAYS FOR CELLULAR TELEPHONES AND SIMILAR APPARATUS

This invention relates to displays for cellular telephones and other similar wireless telephones, for example direct satellite telephones; for convenience all such wireless telephones will hereinafter be referred to as "cell phones". The displays of the present invention may also be useful in other similar portable electronic devices.

The use of cell phones is expanding rapidly throughout the world, and an increasing proportion of such phones are now equipped for wireless data access, either through the Internet or other data access systems, including E-mail systems. For example, traveling business require continuous access to their E-mail and often also need access to facsimiles and the resources available on the World Wide Web.

Unfortunately, because of the need for portability, the displays of most cell phones are inadequate for displaying anything more complicated than telephone numbers and brief textual E-mail messages. In particular, a typical cell phone display is wholly inadequate for displaying any reasonably complicated graphics, yet there are many occasions where field personnel urgently need access to corporate databases containing such graphics. For example, a technician encountering a faucet, refrigerator or television set of a type with which he is not familiar may require access to a database describing the type.

There is a clear need to equip cell phones with some type of auxiliary display which is substantially larger and has higher resolution than the display provided on the cell phone itself. One solution is to provide an interface between the cell phone and a portable computer, thus enabling text and graphics transmitted to the cell phone to be displayed on the computer screen, and such interfaces are well known in the art. However, the need for the portable computer greatly increases the traveling weight of the unit, and it may be inconvenient to connect the cell phone, the interface unit and the computer in the field. Furthermore, the liquid crystal display (LCD's) conventionally used portable computers are fragile and are likely to be damaged if they are thrown into

a bag with a technician's tools are left where such tools might accidentally be dropped on them. Similar problems are encountered if one attempts to use an LCD monitor as the external display for a cell phone. Furthermore, the power requirements of personal computers or LCD monitors are so great that, unless a very large and heavy battery is used, the maximum time of operation on batteries of the external display will be substantially shorter than that of the cell phone.

Accordingly, there is a need for a cell phone to be equipped with an auxiliary display which is larger and has higher resolution than the display provided on the cell phone itself, but which is lighter, less complicated and less expensive than a personal computer or LCD monitor.

The present invention provides a cell phone in combination with an external display device which uses an electrophoretic display medium, preferably an encapsulated electrophoretic display medium; such an encapsulated electrophoretic display medium may hereinafter be referred to as "electronic ink." Full details are electronic ink suitable for use in the display device of the present invention are described in International Applications Publication Nos. WO 99/10767, WO 99/10768 and WO 99/10769; and in copending U.S. Patent Applications Serial Nos. 09/561,424, filed April 28, 2000; 09/565,417, filed May 5, 2000; 09/624,898, filed July 25, 2000; and 09/606,070, filed June 29, 2000. The entire contents of all the aforementioned publications and applications are herein incorporated by reference.

The external electronic ink screen can communicate with the cell phone by cable, infra-red or short-range wireless means. The cell phone may be used for applications such as World Wide web surfing. Information is displayed on the external electronic ink screen that is not visible (or is only partially visible) on the cell phone screen.

The external screen is portable, typically from 2 to 14 inches (51 to 355 mm.) diagonal and preferably 4 to 10 inches (101 to 254 mm.) diagonal, less than one half inch (13 mm.) in thickness and ideally less than one quarter inch (6 mm.) in

thickness, and weighing less than one pound (454 g.) and ideally less than 6 ounces (170 g.). To be a useful improvement over conventional cell phone displays, the external display screen should handle at least 64 x 120 pixels and more desirably half- (320 x 240) or full-VGA (640 x 480) resolution or better.

5 As discussed in the aforementioned publications and applications, electronic ink displays can be formed on flexible substrates, and the resultant ability to form flexible displays is an important advantage in the context of the present invention. For example, the external display could have the form of a scroll which could lie flat against the side of the cell phone when not in use, but which could be extended to form
10 a flat screen, held by support members which could fold out from the phone housing, when the external display is in use. Alternatively, the external display could be foldable (for example, in concertina form) so that it folds flat against the side of the cell phone when not in use, but could be extended to form a flat screen, held by support members which could fold out from the phone housing, when in use.

15 The external screen may draw power solely from the cell phone, eliminating the need for a separate battery. The external screen should draw power primarily during image update so that the screen is primarily drawing no power even while the user is reading. In this connection, the bistable nature of most electrophoretic display media, as discussed in detail in the aforementioned publications and
20 applications, greatly reduces the power requirements of the external display. The external screen typically will contain row and column drivers and in some cases a separate controller.

25 The external screen may be used purely for output, but it may also have input capabilities such as a touchscreen or buttons. In one preferred variant of the invention uses a simple sequence of four to eight buttons along the side in a manner similar to what is commonly used for automated teller machine (ATM's) displays, personal digital assistants (PDA's), or handheld computers, thus permitting a useful degree of interactivity. A jog dial or a mouse may be used to select options or scroll

between pages. However the device might also not have any buttons, relying on the cell phone inputs for selection and control.

The reflective nature of the electronic ink display eliminates need for a backlight, and thus the power drain associated with such a backlight. To achieve legibility in typical office lighting conditions, the reflective display should have a reflectivity of at least one-third the brightness of white paper and a contrast ratio of at least 6 to 1, similar to newspapers, but ideally 10 to 1 or better. Ideally the display could be used as a source for typical copier machines, so that a mobile worker could access a document, copy it from the external display using a standard copier, and thereby obtain printouts with good resolution and readability.

Many PDA's are today being provided with cell phone capability. However, in accordance with the present invention PDA functions can be added to a cell phone, and web software used to permit the user to access PDA functions such as address book and calendar over a network. Thus, the cell phone and external display together make a cheap, thin mobile client that can nevertheless benefit from intense computations or large-scale database access back on the server end.

In the present invention, the external display screen may be attached to the cell phone by any suitable physical means and using any suitable protocol. For example, the cell phone may serve as a universal serial bus (USB) master and the display device as a USB slave. This permits the device to access both data and adequate power in a well-defined and cross-device standardized way at a low incremental hardware cost. Furthermore cell phones with USB masters could drive data to many other peripherals including large electronic ink signs and many multimedia devices. In addition, USB or similar standards permit a large number of devices to be daisy-chained or networked to a single cell phone in an easy manner so that all the devices can share one external network access point.

While USB is a more elegant solution, serial lines, IIC, and 8-bit parallel are the current standard communication methods for cell phones, and these may also be implemented in the present invention.

5 A common screen format such as VGA would enable many wireless application providers to all write to a common standard. Support for a common markup language such as HTML or XML would enable many types of external portable screens to exist and to benefit from the same wireless applications, spawning a new class of cell phone peripherals.

10 A preferred embodiment of the present invention includes a mechanism which provides universal attachment of a small ("pocket sized") external screen to the side of a cell phone so as to facilitate single handed use of the system. For example, a plastic slide track piece with an adhesive back may be sold with the screen. The slide track is attached to the side of the cell phone when the user wishes to add the external screen functionality. The track can be made low profile so that it does not materially
15 impact the form factor of the original cell phone. The edge of the display screen (or part of the top half of the edge) is designed so it can be easily slid, secured, and removed from the track.

Also a cable for the external screen can be spooled within the footprint of the unit so as to preserve portability and avoid mishandling during transport. The
20 advantages of this approach are: 1) universality, 2) simplicity, 3) low cost, 4) no additional loose parts/cradles, 5) no significant volume added to the phone when the external display is not in use, 6) people can use the product in either of two configurations.

25 Since the external screen will typically be bistable, the cell phone need not buffer data for a complete screen. Instead the cell phone may write out all or a portion of the screen information in a manner similar to outputting to a printer rather than operating a traditional display. Thus, a large image may be created by refreshing discrete portions of the display sequentially. Reducing the buffer memory needs of the

cell phone in this manner greatly reduces its cost. The device would not need RAM, a microprocessor, flash memory, or a battery, although it would typically still need a microcontroller. Because the electronic ink external display can update in parts, it can also employ peripheral communications standards like USB rather than high-speed clocked data lines, such as are used by most LCD displays.

The typical energy draw for portable cell phone screens is based on sizes ranging from 1-4 inch (25 to 101 mm.) diagonals, and consists of 44 J power draw (25 J for the display and 19 J for the backlight) assuming a typical usage model (8 hour day, 5% transmit, 5% receive, 90% standby, backlight times out 10 seconds after last key press, total use 3 minutes/day for 6 calls of 10 minutes each; shows only time, date and signal strength in standby). Since the total energy budget for the cell phone is 26855 J, this is a tiny fraction of the energy budget. The display draws 1.2 mW/0.9 mW during talk/standby, but while the buttons are being pressed the backlight is on and draws 108 mW. (Source: R. Akins "Displays for Hand-held Portable Electronic Products", SID (Society for Information Display) Invited Paper, SID Digest, May 2000).

An external screen using an electronic ink display medium need draw very little power. It is estimated that a USB external cell phone display would use about 20mA during an update (most of which goes to powering the microcontroller), which might last 1 second. If an update took place once every 10 seconds this would be a steady state power draw of $20\text{mA} * 5\text{V (USB power)} * 1\text{sec}/10\text{sec} = 10\text{ mW}$. Over one hour, this would use 36 J, an almost negligible amount of power. Thus, while there could be batteries in the display, preferably the external display is powered by the phone, thus reducing the cost of the external display and maximizing its portability.

Another cell phone application in which electrophoretic display media could be useful is in providing a visual equivalent of the ringer of the phone. There are many circumstances (for example, in a business meeting, a restaurant or a concert) where the user of a cell phone needs to know when a call is received, but where an audible ring is inconvenient or even embarrassing. One approach to solving this

problem is to provide a visual rather than audible warning of an incoming call. However, most conventional visual warning devices are ill-suited for use with cell phones. Conventional small incandescent bulbs, such as are use in flash lights, may prove too fragile when subjected to the handling to which cell phones are subjected, and may impose current demands larger than those conveniently supplied by cell phone batteries. A light emitting diode could be used as a visual indicator, but draws power continuously, thus reducing the operating time of the cell phone, and is only visible over a limited range of orientations. Also, a light emitting diode covers only a few square millimeters, and thus may not be visible when the phone is placed in certain positions relative to the user.

Electrophoretic visual displays, and especially encapsulated electrophoretic ("electronic ink") displays are well suited to act as a visual indicator for a cell phone. Such a visual indicator may be used to indicate a ring by flashing or otherwise visually indicating that a call is incoming. Different colors, frequencies, intensities or other visual cues may be used in combination with caller ID or call waiting to indicate information about the call. Other visual states such as voice mail or E-mail waiting may also be visually indicated.

The electronic ink visual indicator may be attached to the surface of the cellphone or be present in an external cellphone case or other peripheral attachment. The visual indicator may be curved, flexed or conformed to the surface. The visual indicator may cover a large portion of the surface.

The thin, flexible nature of electronic ink allows it to cover the surface in an ergonomic, lightweight way while still achieving a large display area, which is a critical requirement for a visual indicator. The visual indicator may be wrapped around multiple sides of the cell phone, so that it is visible regardless of the orientation of the phone. The low power requirement of electronic ink permits the visual indicator to function with minimal battery drain. The bistability of electronic ink allows persistent "flags", such as E-mail or voice mail flags, to remain visible without drawing power.

The light weight of an electronic ink visual indicator achieves its functionality with minimal reduction of portability.

- 5 It will readily be apparent to those skilled in the relevant art that numerous changes and modifications could be made to preferred embodiments of the invention discussed above without departing from the scope of the invention. Accordingly, the foregoing description should be construed in an illustrative and not in a limitative sense.

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